

CLAIMS:

1. A rotating machine, comprising:
a superconductive coil disposed within a rotor; and
a temperature sensor operable to provide a signal representative of superconductive coil temperature.
2. The rotating machine of claim 1, comprising a control system communicatively coupled to the temperature sensor and operable to reduce electric current in the superconductive coil when a signal representative of a defined superconductive coil temperature is received from the temperature sensor.
3. The rotating machine of claim 2, comprising a thermally conductive sheet disposed around the superconductive coil, wherein the temperature sensor is disposed between the thermally conductive sheet and the superconductive coil.
4. The rotating machine of claim 3, comprising a layer of insulation disposed between the thermally conductive sheet and the superconductive coil, wherein the temperature sensor is embedded in the layer of insulation.
5. The rotating machine of claim 2, wherein the temperature sensor transmits a signal representative of the temperature of the superconductive coil to the control system via telemetry.
6. The rotating machine of claim 2, comprising a resistor, wherein the control system couples the resistor in series with the superconductive coil to discharge the magnetic energy stored in the coil when the signal representative of a defined superconductive coil temperature is received from the temperature sensor detected.
7. The rotating machine of claim 2, wherein the control system is operable to compensate for magneto-resistive effects produced in the temperature sensor by the magnetic field produced by the superconductive coil.

8. The rotating machine of claim 1, wherein the temperature sensor is a resistance temperature detector .

9. The rotating machine of claim 8, wherein the resistance temperature detector comprises a wire disposed adjacent to an expected region of the lowest critical current in the superconductive coil.

10. The rotating machine of claim 9, wherein the resistance temperature detector wire is disposed in a bifilar configuration.

11. A quench monitoring and control system for a superconductive coil, the system comprising:

a temperature sensor operable to provide a signal representative of superconductive coil temperature; and

a control system coupled to the temperature sensor and operable to reduce electric current in the superconductive coil when a signal representative of a defined superconductive coil temperature is received from the temperature sensor.

12. The system of claim 11, wherein the superconductive coil is disposed within a rotor core.

13. The system of claim 12, comprising a thermally conductive sheet disposed around the superconductive coil, wherein the temperature sensor is disposed between the thermally conductive sheet and the superconductive coil.

14. The system of claim 13, wherein the thermally conductive sheet is operable to transmit heat produced in the superconductive coil at a remote location to the temperature sensor.

15. The system of claim 11, wherein the temperature sensor comprises a resistance temperature detector wire.

16. The system of claim 15, wherein the resistance temperature detector wire is disposed longitudinally along the superconductive coil adjacent to an expected region of lowest critical current in the superconductive coil.

17. The system of claim 11, wherein the temperature sensor transmits a signal representative of the temperature of the coil to the control system via radio telemetry.

18. The system of claim 11, wherein the control system activates a circuit to reduce the current in the superconductive coil when the signal representative of a defined temperature is received from the temperature sensor.

19. A method of operating a rotating machine having a superconductive coil, the method comprising:

providing a signal representative of superconductive coil temperature to a control system operable to control current to the superconductive coil; and

reducing current to the superconductive coil when a signal representative of a defined superconductive coil temperature is received.

20. The method of claim 19, wherein reducing current to the superconductive coil comprises activating a circuit to remove current flowing to the superconductive coil.

21. The method of claim 19, wherein reducing current to the superconductive coil comprises connecting the superconductive coil in series with a resistor to discharge the magnetic field stored in the superconductive coil.

22. The method of claim 19, wherein reducing current to the superconductive coil comprises comparing the signal representative of superconductive coil temperature with a reference signal indicative of a quench condition.

23. The method of claim 22, wherein reducing current to the superconductive coil comprises compensating for magneto resistance effects caused by the superconductive coil on the temperature sensor.

24. The method of claim 23, wherein compensating for magneto-resistance effects comprises establishing a magnetic field strength experienced by the sensor based on superconductive coil current and applying a correction to the signal representative of superconductive coil temperature based on the magnetic field strength

25. A method of manufacturing a rotating machine, method comprising;
disposing a superconductive coil inside a rotor; and
disposing a temperature sensor proximate to the super-conductive coil to enable the temperature sensor to provide a signal representative of superconductive coil temperature.

26. The method of claim 25, comprising disposing a copper sheet around the superconductive coil proximate to the temperature sensor.

27. The method of claim 25, comprising coupling a control system to the temperature sensor, wherein the control system is operable to reduce electric current in the superconductive coil when a signal representative of a defined superconductive coil temperature is received from the temperature sensor.

28. The method of claim 25, comprising coupling the temperature sensor to telemetry operable to transmit the signal representative of superconductive coil temperature to the control system.

29. The method of claim 25, wherein the temperature sensor comprises a resistance temperature detector wire and disposing a temperature sensor proximate to the superconductive coil comprises disposing the resistance temperature detector wire longitudinally along the superconductive coil.

30. The method of claim 25, disposing the temperature proximate to the superconductive coil comprises disposing the temperature sensor adjacent to the expected region of lowest critical current in the superconductive coil